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INSIDE

The Food Safety Consortium Newsletter is a production of the three member schools of the consortium: University of Arkansas, Iowa State University and Kansas State University. Your comments are welcome.

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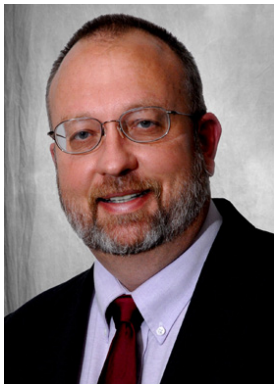
Direct-Fed Microbials Take Another Step Against *Salmonella*

A few years ago Billy Hargis's poultry research laboratory found how to develop probiotics — also known as direct-fed microbials (DFMs) — that would work in the drinking water of chickens and turkeys to fight *Salmonella*. One of their DFM products was designated as FM-B11 and was licensed to a startup company. It then became a product called FloraMax. It was clear, however, that going to the next level was necessary.



Billy Hargis

Hargis, director of the University of Arkansas Division of Agriculture Poultry Health Research Laboratory, explained that FloraMax has been successful as a drinking water treatment to reduce the *Salmonella* levels in birds and ultimately on carcasses at processing. Performance, a crucial component for the poultry industry as it determines how to allocate its dollars, is difficult to measure. In published research, Hargis' team has shown that meaningful improvements in production efficiency occurred with this DFM product. Problematic for some poultry producers was that FloraMax must be administered in the drinking water because it is not stable in feed.

Hargis and his research team continued their project, funded by the Food Safety Consortium, and turned to development of new DFMs using bacteria from the *Bacillus* genus. Some *Bacillus* isolates produce heat-resistant spores that could potentially be used in feed milling with easy and continuous administration in poultry feed.

Fighting foodborne pathogens is always the main focus of the research, but Hargis knows there are other factors that dictate whether the research will be applicable. "We also realize that unless there's an economic incentive to use this approach other than just the control of food-

(Continued on page 2)

Grant Helps Frontier Students Get Their 'FIX'

Reprinted from the October 2009 edition of Lifelines, *the online newsletter of the Kansas State University College of Veterinary Medicine*

FIX: It's a fun name for a serious learning opportunity — so serious the Frontier program at Kansas State University was able to secure a $390,000 grant from the Department of Homeland Security (DHS), through its Science, Technology, Engineering and Mathematics (HS-STEM) Career Development Grants program. This program enables colleges and universities to award scholarships and fellowships to qualified undergraduate and graduate students in HS-STEM disciplines who intend to pursue homeland security careers. The grants help "track" students into employment in Homeland Security, while providing them with unique travel and internship opportunities.

> ***Dealing with a complex set of issues requires a blended, interdisciplinary approach.***

Frontier, which is partially funded by the Food Safety Consortium, is an interdisciplinary program for the historical studies of border security, food security and trade policy run through the Department of Diagnostic Medicine and Pathobiology through the College of Veterinary Medicine. The program was the brainchild of Justin Kastner, assistant professor of food safety and security at K-State, and Jason Ackleson,

(Continued on page 2)

Direct-Fed Microbials … *(Continued from page 1)*

borne pathogens, there is going to be very limited use," he said.

DFMs are beginning to be used frequently in animal feed as an alternative to antibiotics and serve as growth promoters. For several years, interest has risen in developing new DFMs that are safe for use in animal feeds and effective for both performance enhancement and reduction of food-borne disease-causing bacteria. Such efforts led Hargis and his team to develop what ultimately was named FloraMax.

While that was a successful venture, Hargis noted, "there is still an increased need to have highly effective DFMs that are shelf-stable, cost-effective and feed stable (tolerance to the heat pelletization process) to increase compliance and widespread utilization."

Bacterial spore formers from the genus *Bacillus* are among the DFM products being developed. Coming from specially selected spores, the resulting probiotic products can be stored indefinitely on the shelf and survive the extreme heat treatment of commercial poultry feed, Hargis said.

The research at the UA poultry health lab has identified a combination of spore isolates from *Bacillus* species that are as effective as FM-B11 at reducing *Salmonella enteritidis* in chickens and turkeys. It's a major step.

"The ability to grow *Bacillus* to huge numbers of stable and cost-effective spores that can decrease pathogenic bacteria will have a tremendous impact on broiler health and productivity," Hargis said.

The economic impact of using spore-derived DFMs can provide a financial advantage for industry along with the ability to improve food safety. That's why the Hargis research team discarded spore isolates if they didn't grow to large numbers in inexpensive media.

Hargis explained that the cost of reducing *Salmonella* creates an incentive for industry to seek ways to do so efficiently.

"If we can reduce the pathogens that cost the producer money, then it adds value to the approach of using DFMs," he said. "That may be part of the key to accomplishing the goal of reducing pathogens in food that comes from poultry and reducing pathogens capable of causing human food-borne illness in live poultry. We've got to give them a return on their investment."

It is essential, Hargis said, is that the product be developed at a cost that won't discourage its use. Finding spore isolates for feed that are capable of reducing *Salmonella* and other pathogens in poultry has the potential of doing the job.

"Now we may have something that we actually do in the real world that makes food safer and that companies are willing to pay for," Hargis said. "We're looking to do something and trying to achieve some results. If this was easy, it would have been done before." ■

Grant Helps … *(Continued from page 1)*

Julianne Jensby, junior in food science and pre-medicine, tells Frontier students about her FIX at Los Alamos National Laboratory, N.M.

associate professor of government at New Mexico State University, Las Cruces. They also work closely with Abbey Nutsch, assistant professor of food safety and security in the Department of Animal Sciences and Industry. Kastner, Ackleson and Nutsch are the leaders of the new DHS grant.

Kastner and Ackleson originally met while studying in London and later realized there was an opportunity to combine disciplines and expertise toward a common goal. Dealing with a complex set of issues requires a blended, interdisciplinary approach that can bring different perspectives and methods of analysis, so they developed this concept to be open to undergraduate, graduate and distance-education students who were also interested in these issues or working in a related field.

FIX stands for "Frontier Interdisciplinary eXperiences." FIX projects involve studying problems from multiple academic perspectives and producing written and/or multimedia products for the Frontier Web site at http://frontier.k-state.edu. Frontier's FIX program is geared primarily for on-campus K-State and New Mexico State University students, who are then identified as Frontier scholars. Scholars are expected to develop a broad understanding of key issues and then develop a concept for their individualized FIX projects, on which they receive guidance and support from Frontier's faculty mentors and student coordinators.

Some of the FIX projects have included travel to Washington, Los Alamos, N.M., and the U.S.-Mexican border to examine current policy efforts as well as physical sites and facilities related to border security and food security.

Kastner said, "The DHS career development grants provide a tremendous boost to our program. Drs. Ackleson and Nutsch and I are continually looking for ways to provide unique interdisciplinary learning opportunities for our students. This grant helps us to do just that." ■

Antibiotics Found to Aid Reduction of *E. coli* in Swine

Animal producers know that the current trend is to discourage the continued use of antibiotics in livestock. But recent Food Safety Consortium-supported research at Iowa State University shows that antibiotics may be helpful in reducing the pathogen *E. coli* O157:H7 among swine.

Nancy Cornick, the ISU associate professor of veterinary microbiology who conducted the study, noted a 2001 survey that showed 80 percent of producers treated their swine with antibiotics, mostly for disease prevention and growth promotion. In her study, Cornick examined the usage of three particular antibiotics — tylosin, chlorotetracycline and bacitracin methylene disalicylate — that are generally used at dosages to encourage growth promotion.

Cornick's project showed that the pigs that were fed the diet supplemented with chlorotetracycline and tylosin shed significantly less *E. coli* O157:H7 than did pigs that were fed antibiotic-free diets. "The antibiotics I chose were the ones that were most commonly added at subtherapeutic doses, which is what they're usually looking for with growth promotion," Cornick said.

Cornick noted that many veterinarians favor an end to administering subtherapeutic antibiotics because they aren't used for disease treatment or disease prevention. The problem, she explained, is that incidents of disease in swine may increase when producers stop using the subtherapeutic antibiotics.

Nancy Cornick

The problem is that incidents of disease in swine may increase when producers stop using the subtherapeutic antibiotics.

E. coli O157:H7 is well known as a significant cause of foodborne illness in meat that comes from cattle, but the pathogen is not as prevalent in swine. Studies in recent years have found reports linking pork products to outbreaks of human disease caused by *E. coli* O157:H7. Cornick acknowledged that such incidents are rare, but the potential problem is worth keeping on food producers' radar.

Cornick pointed to the case of feral pigs in California that were suspected along with cattle of contributing to *E. coli* O157:H7 contamination in a vegetable field in the Salinas Valley in 2006. "I would argue that those feral pigs were probably exposed to fewer antibiotics than conventionally raised swine," Cornick said. "That may be a reason that they were colonized by the *E. coli* O157:H7."

Even without *E. coli* O157:H7 being a widespread occurrence in pigs, Cornick believes the potential makes it a problem worth investigating. With low level fecal shedding, the pigs can transmit the pathogen among each other. If usage of antibiotics drops off, Cornick wonders if there would be a corresponding increase of *E. coli* O157:H7.

"Maybe there would be," she said, "or if I can find another reason why *E. coli* O157:H7 isn't in swine then maybe that's something cattle producers can use as a management strategy." ■

Papers & Presentations

Justin Kastner, Abbey Nutsch and **Curtis Kastner**, Kansas State, are the authors of a chapter in *Wiley Handbook of Science and Technology for Homeland Security*, edited by John Voeller and published by John Wiley and Sons, Inc. The chapter is titled "The Role of Food Safety in Food Security/Defense."

Curtis Kastner, Kansas State, delivered a presentation on "Food Safety Consortium Research at Kansas State University" in October at the Arkansas Association for Food Protection Educational Conference in Springdale.

Catherine Strohbehn and **Lakshman Rajagopal**, Iowa State, delivered a presentation on "College and University Dining Directors' Views on Food Allergen Policies and Practices in Higher Education Settings" in July at the National Association of College and University Food Services annual meeting in Milwaukee.

Strohbehn also was interviewed for an article on "Food Expiration Dates Not Always Clear" in September in the *Chicago Tribune* and cited in "Dude, Did You Wash 'Em?" in September in *Florida Restaurant and Lodging*. She wrote an article, "Shigella in the Trenches," in October in the *National Provisioner*. ■

Johnson Scholarship Established by Arkansas Association for Food Protection

Michael Johnson

The University of Arkansas is now accepting contributions to the Michael G. Johnson Endowed Fund in Food Science. The Arkansas Association for Food Protection announced the scholarship when it honored Johnson, an emeritus professor of food science who retired in 2009 after 25 years with the U of A.

At the AAFP Educational Conference in October, Johnson was honored by testimonials from colleagues and former graduate students. In his remarks to the audience, Johnson said mentors should direct their time to people who are working their way up. This "spirit of investing" prepares the next generation of researchers to pass their skills along to future students, he said. He advised researchers to be proactive in food protection issues and to "take what works for you and pass it on."

The U of A has set up a procedure for donors to contribute to the fund online by following these steps:

1. Go to the UA Office of Development online donor site at **https://payments.bankofamerica.com/otp/StartAction.do?UARK** and enter your phone number.
2. Complete the online donation form. At the drop-down menu for "Designate Gift 1," select the line for "Other — type in description below."
3. At the line for "Other Specific Department or Program," type in "Michael Johnson Endowed Fund in Food Science."
4. At the line for "Is this an honor/memorial gift?" select "Honor."
5. At the line for "Honor/Memorial Designee," type in "Michael Johnson."
6. Leave blank the line for "Designee Address (for notification purposes)." The UA Office of Development will notify Dr. Johnson of donations to the fund.
7. Proceed with the credit card donation procedures.

To discuss major contributions, contact Kellie Knight, director of development for the UA Dale Bumpers College of Agricultural, Food and Life Sciences, at knight@uark.edu or 479-575-2270. ■

USDA, HHS Laud Opening of Import Food Safety Center

Agriculture Secretary Tom Vilsack and Health and Human Services Secretary Kathleen Sebelius commended the Department of Homeland Security in December for opening a center devoted to ensuring the safety of foods imported to the United States. The Commercial Targeting and Analysis Center (CTAC) for Import Safety is operating under the direction of Customs and Border Protection. It was created on the recommendation of President Obama's Food Safety Working Group, which is charged with advising the president on how to upgrade the U.S. food safety.

"As co-chairs of the Food Safety Working Group, we are committed to improving the safety of food produced in the United States and also improving the safety of all the food that makes it to the American consumers' dinner tables," said Sebelius. "With so much food coming from abroad, we must do all we can to ensure that it conforms to the same safety standards as our own food safety systems."

"As part of the Food Safety Working Group's efforts to strengthen the food safety system in this country, we identified close cooperation between federal agencies as a key to achieving real progress," said Vilsack. "The new CTAC announced today is an important step toward the type of collaboration necessary to ensure that Americans have access to a safe and healthy food supply."

"In addition to guarding against terrorism and crime, securing our borders and facilitating legitimate trade involve ensuring the safety of imported products," said Homeland Security Secretary Janet Napolitano. "This new targeting center will enhance the inspection of goods entering our country by centralizing and strengthening federal efforts to protect U.S. consumers."

The import safety CTAC in Washington is one of six commercial targeting centers in the United States. It will specifically target shipments of imported cargo, including food, for possible safety violations. The U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS) and other partnering government agencies, including the U.S. Food and Drug Administration (FDA), the Environmental Protection Agency and the Consumer Product Safety Commission, will provide on-site expertise at the Center.

"The expertise FSIS, FDA and our other partners bring to the table is invaluable to ensuring that America's imported food supply is safe," said CBP Acting Commissioner Jayson P. Ahern. "We look forward to continued cooperation with the Food Safety Working Group and its future recommendations."

As part of its collaboration with CBP, FSIS will extend its enforcement efforts to target ineligible imports investigate suspicious shipments based on manifest information filed prior to the arrival of goods at U.S. ports. ■

Consumers Still Aren't Heeding the Kitchen Rules

It's a simple enough message for consumers to know so they'll make sure the produce in their kitchen is clean: rinse, scrub, rub and dry with a clean paper towel. Because either they fail to follow through on that knowledge or they don't know in the first place, most consumers aren't getting the job done.

Although most consumers indicated on earlier surveys that they knew what to do, University of California-Davis researchers wanted to see what they actually were doing in the kitchen. So they went there and looked.

Christine Bruhn, director of the UC-Davis Center for Consumer Research, and Ho Phang, a master's student in food science, conducted the survey and took video cameras into the homes to document the results. Phang reported what they found during a presentation in June at the Institute of Food Technologists annual meeting in Anaheim, Calif.

Phang said their observations showed that 47 percent of the participants washed their hands before preparing burgers and salads, taking an average of 6 seconds to do so. (The U.S. Department of Agriculture's Fight BAC guidelines for consumers recommend taking 30 seconds to wash hands.) Thirty percent of them used soap. After washing, 22 percent used a clean towel for drying the hands.

Phang said the majority washed their vegetables with water as they rubbed their hands on them. Most of them dried the lettuce, tomatoes and celery, but only 4 percent took the time to dry the tomatoes and celery adequately.

The results showed that things haven't improved since surveys from a few years earlier. Phang mentioned a 2003 survey that found 82 percent of respondents knew they should wash hands after handling raw meat and poultry, but 75 percent of them failed to do so. Another survey in 2002 found that most people said they did not clean produce adequately because they thought it was already clean or they thought that getting rid of the produce's skin was all they needed to do. ■

Book From FSC Researchers Published by UA Press

Perspectives on Food-Safety Issues of Animal-Derived Foods

Edited by Steven C. Ricke and Frank T. Jones

The University of Arkansas Press has released a book of essays compiled from the presentations of several food safety researchers who delivered their work during a Food Safety Consortium annual meeting. *Perspectives on Food-Safety Issues of Animal-Derived Foods* is being marketed by the Press and is available through http://www.uapress.org/titles/fa09/ricke.html.

As recent stories in the news have shown, maintaining the integrity of the food supply is of critical importance to the consumer. Thousands of Americans die each year from foodborne illnesses, and millions more get sick. Tremendous strides have been made to reduce the incidence of foodborne diseases originating from animal-derived foods, but food safety and foodborne pathogens continue to remain problematic throughout the world. Food safety scientists from around the nation continue to conduct groundbreaking research not only to understand causative factors in foodborne pathogen prevalence but to develop novel intervention strategies for limiting contamination in all phases of food animal production.

The 24 essays in this book highlight research efforts of researchers from the tri-state Food Safety Consortium established in 1988 by Congress as a research alliance of food-safety scientists at the University of Arkansas, Iowa State University and Kansas State University. Members of the consortium conduct research through an annual grant approved by Congress and administered by the U.S. Department of Agriculture. Its mission is to conduct extensive investigation into all areas of poultry, beef and pork meat production, from the farm to the consumer's table.

In addition to the consortium researchers, collaborative university researchers, government officials and industry personnel provide timely reviews of their latest findings with regard to five significant subject areas: pre-harvest foodborne pathogen ecology and intervention strategies, postharvest foodborne pathogen ecology, rapid methods and detection strategies for foodborne pathogens, antibiotics and antimicrobials in food safety and emerging issues in food safety. Progress in these research areas provides opportunities to further enhance protection of animal-derived foods from farm to fork.

Steven C. Ricke is the Donald "Buddy" Wray Chair in Food Safety and director of the Center for Food Safety in the Institute of Food Science and Engineering at the University of Arkansas. He is editor in chief for *Bioresource Technology* and a member of the editorial board of the *Journal of Food Protection*.

Frank T. Jones is emeritus associate director for extension, Center of Excellence for Poultry, at the University of Arkansas. ■

Food Safety Digest

by Dave Edmark

A new national food safety law took effect in China last summer. Dan Harris, an attorney with an international practice at the Harris and Moure law firm of Seattle, wrote on the firm's China Law Blog (http://www.chinalaw-blog.com/) that the law itself won't bring about the changes necessary to implement real food safety in China.

"It is not uncommon in China for laws to be adopted on controversial topics that leave nearly all of the details to later regulation," Harris said in a Dec. 16 post. "The usual result in China is that such regulations never appear, rendering the law essentially meaningless. That has so far been the fate of the standards and procedures portion of the Food Safety Law."

Harris said the new law would not resolve food safety problems in China because government supervision and administrative sanction aren't enough to accomplish the goal. To be effective, food safety standards need to exist where a private civil litigation system allows injured parties to take action. China also lacks the resources to hire enough qualified inspectors and regulators to place throughout the food production process.

"The government can play an important role in setting the proper standard, but only when Chinese citizens can use China's court system to obtain damages will China's food safety likely markedly improve," Harris said. "China's tort system is undeveloped and regulators strongly discourage its use in safety and health-related matters."

One element is working in favor of food safety in China, Harris noted. Consumers in the nation's bigger cities are concerned about food safety. "The food companies know this, and they have stepped up their quality control monitoring, and they are not shy about getting this word out."

■ ■ ■

India is cracking down at the national level on adulteration and contamination in items considered to be high risk such as packaged milk, edible oils and meat. The *Times of India* reported in December that those items have previously been regulated by the states. The central government will now implement several new standards. They include standards for slaughter houses governing how and what kinds of animals are slaughtered, how the animals and meat are transported and hygiene levels at slaughter houses. The central government will also regulate hygiene quality and safety of food served by railways, airlines and airports, large canteens, hotels, restaurants and schools. Also, the government will implement a hazard analysis and critical control points study throughout the food production and distribution chain.

■ ■ ■

The Kansas Department of Agriculture has ended contracts under which a few local health departments conducted safety inspections at restaurants and food service businesses. Now, the state will take over the tasks directly as a cost savings measure. The state will save about $245,000.

The state had been contracting out the inspection services to the health departments in Saline, Douglas, Geary, Riley and Reno counties. It will take over the job in those counties but will continue to contract the work to the health departments in Lyon and Johnson counties and in the city of Wichita.

Lisa Taylor, a spokeswoman for the Department of Agriculture, told *The Wichita Eagle* that consumer complaints involving foodborne illness will be answered within 24 hours in counties where the state takes over the inspections and within 48 hours if an illness is not involved.

Don Sayler, president of the Kansas Restaurant and Hospitality Association, wasn't worried about the switch. "The safety of our food isn't going to change," he said. "All they've done is change from contract inspections to put it back at the state level. It's an economic issue only and we applaud the KDA for stepping up and being a leader. It's not the elimination of a service and the public needs to understand that."

■ ■ ■

Norovirus, which causes symptoms consistent with stomach flu, was responsible for the most foodborne illnesses among school cafeterias in the past decade, according to an investigation published in December by *USA Today*. The newspaper said norovirus is linked consistently to improper food handling in cafeterias.

The article quoted statistics from the U.S. Centers for Disease Control and Prevention showing that norovirus caused one-third of the 23,000 foodborne illness cases reported in schools from 1998 through 2007.

"The predominant source of norovirus infections are food handlers," Michael Doyle, director of the University of Georgia Center for Food Safety, told the newspaper, adding that kitchen workers are where he would look first for norovirus infections. Cafeteria inspections are key to controlling the situation. The newspaper reported that 8,500 school cafeterias were not inspected in 2008 and another 18,500 did not meet a federal requirement that cafeterias must be inspected at least twice a year. ■